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Developing software processor to carry out analytical operations on trigonometric series using oop method

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Abstract

© SGEM2018. In celestial mechanics, when describing the dynamics of celestial bodies, as a rule, two approaches are used: numerical and analytical. The numerical approach began to develop from the middle of the 20th century, when powerful computers appeared. He gives high-precision ephemeris and the theory of rotation of celestial bodies. Analytical methods began to be used from the end of the 19th century. Thinkers of that time developed powerful mathematical tools that allowed obtaining celestial bodies coordinates with the necessary for that epoch accuracy. The analytical dependence on time in this approach is given in the form of trigonometric or more complicated series. Increasing the accuracy of observations constantly requires increasing the length of the series. In the late 50's of the 20th century the algebraic manipulators began to appear which represent computer programs capable to perform analytical operations on trigonometric series. “Algebraic manipulation” refers to the use of a computer to manipulate mathematical expressions in a formal fashion. Historically, codes for such operations were written, usually on the FORTRAN language in the frame of structural approach. With all the advantages of FORTRAN, developing user programs within the framework of structural programming on FORTRAN is not very effective. In this article, we describe the importance of analytical processors for science, as well as we present the ways to optimize both their work and convenient user interface within the object-oriented approach by the means of the C# language.

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Keywords

Algebraic manipulators by computer, Analytical approach, Celestial mechanics, Structural and object-oriented programming, Trigonometric series

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